

U.S. Application 09/619,560

Attorney Docket No. 2000B047

REMARKS**Interview Summary**

Applicants appreciate the Examiner's granting an interview on August 13, 2003. All of the pending claims were discussed in the context of the standing final rejection of May 14, 2003. Applicants argued that the data indicated that the combinations of the specific catalysts claimed were beneficial and showed surprising results. Although no agreement was reached in the interview, the examiner agreed to consider these arguments.

Status of the Claims

Claims 1, 3 to 14, and 16 to 26 presently stand rejected in this application. Applicants have herein amended claims 1, 10, and 19.

Applicants respectfully request entry of this Amendment and reconsideration of this application, as amended.

Claims 1, 3 to 14, and 16 to 26 are presently pending in this application, claims 1, 10, and 19 being independent.

Rejection Under 35 USC § 112

Claims 1, 10, and 19 were previously amended to limit percentages of the first and second crystalline molecular sieves to those percentages which are effective to decrease the concentration, relative to the weighted average of the performance of each of the crystalline molecular sieves alone, of any particular by-product with respect to the weight of monoalkylated aromatic compound produced, as measured at a given conversion of the polyalkylated aromatic compound. The Examiner has indicated that the "limitation added to the claims regarding the effective percentage of the molecular sieve was not described in the specification at the time the application was filed."

Applicants acknowledge that the specific words used were not present in the application, but respectfully submit that the concept of an effective percentage is necessarily present in a specification which demonstrates effectiveness at any particular percentage. Support for at least one effective percentage is found in Table 1 of the specification (in which comparisons are shown at a DIPB conversion of approximately 50% achieved by varying WHSV while holding other conditions constant) and on page 15, line 12, through page 16, line 10, of the specification. The specification further

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indicates preferred ranges of 10 to 75 weight percent for each of the catalysts in the mixture indicating possession of the concept that the mixture was effective in other percentages than the test results shown in Table 1.

In the interest of furthering prosecution, however, Applicants have at present removed the language regarding effective percentages from the present claims 1, 10, and 19, reserving the right to resubmit such claim language in the future. Applicants respectfully submit that the present amendment renders this objection moot and request that the Examiner withdraw the objection under 35 USC § 112.

Rejection Under 35 USC § 103(a)

Claims 1, 3 to 14, and 16 to 22 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Kaufman (U.S. Patent No. 3,385,906) in view of Cheng et al (U.S. Patent No. 5,557,024). In particular, the Examiner argues that Kaufman teaches reaction of benzene with propylene in the presence of an alkylation catalyst to produce cumene-containing product from which is separated a majority of cumene. The remaining effluent is combined with benzene and transalkylated over a catalyst such as zeolite Y. Acknowledging that Kaufman fails to disclose the presently claimed process using a mixture of two different molecular sieves, claim 6's co-extrusion step, or the alkylation catalyst of claim 14, the Examiner relies on the Cheng reference for its disclosure of the use of MCM-22, MCM-49, zeolite Y, zeolite beta and mordenite, including TEA-mordenite, as transalkylation catalysts. According to the Examiner, it would have been obvious to one having ordinary skill in the art at the time of the invention to have modified the process of Kaufman by utilizing a combination of any two of the transalkylation catalysts disclosed by Cheng because each of these is individually used as transalkylation catalysts. The Examiner further argues i) co-extruding the catalyst as required by present claim 6, would have been obvious given Cheng's disclosure of extrusion as a common method for production of a catalyst, ii) using MCM-56 alkylation catalyst as disclosed by Cheng in transalkylation would have been obvious to one skilled in the art because of MCM-56's "high activity and selectivity for the desired alkylated product" and iii) one skilled in the art would have utilized small crystal (less than 0.5 micron) TEA-mordenite inasmuch as Cheng discloses its use as a transalkylation catalyst.

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Kaufman teaches the use of zeolites such as faujasite, and zeolites L and Y, in transalkylation of benzene and by-products of benzene alkylation with propylene, but fails to disclose or suggest any of the presently claimed molecular sieves, much less the combinations of MCM-22 type material and zeolite beta or MCM-22 type material and mordenite, for which surprising results have been shown. Accordingly, it is respectfully submitted that one skilled in the art acquainted with Kaufman and Cheng (which also fails to suggest or disclose the present combinations of molecular sieve for the process now claimed) would not be led to the present invention. Moreover, neither of these references teaches nor suggests the unexpected improvements obtained by the combinations of molecular sieves in the process of the invention now claimed. Applicants respectfully submit that there is no motivation in either the Kaufman or the Cheng reference to combine specific molecular sieves.

In response to applicants' arguments that the claimed process produces superior and unexpected results given the data provided in the Examples of the specification and in the Declaration by Dr. Jane Cheng, the Examiner argues that the showing made by the experimental data is not commensurate with the scope of the presently claimed invention inasmuch as the "claimed process is not limited to the specific ratios of the catalysts as described in the declaration" of Dr. Jane Cheng.

Applicants respectfully submit that the present invention is not a combination of a given percentage of two catalysts, but the combination of the specific transalkylation catalysts disclosed and claimed. There is nothing in the prior art to suggest that the combination of crystalline molecular sieves having a certain X-ray diffraction pattern with selected other crystalline molecular sieves would yield a synergistic effect on the production of by-products in aromatics transalkylation reactions. The catalyst combinations yielding such an effect have been discovered by Applicants. While certain percentage combinations are preferred, having established the benefits of the combination itself, Applicants respectfully submit that the benefit is not limited to the range established by the data submitted. Applicants respectfully submit that the claims are commensurate with the surprising results shown for the combinations tested.

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The data provided by Applicants in Table 1 and in the Declaration by Dr. Cheng indicates that the benefit with respect to a given impurity would be expected to trace a curve separate from the line created by a weighted average of the properties of each catalyst individually. For example, the n-propylbenzene selectivity achieved with MCM-22 alone (Example 3) was 0.104%; with TEA-mordenite alone (Example 4), a selectivity of 0.086% was achieved; however, with a 1:1 ratio of the two (Example 5), a selectivity of 0.077% was achieved. The mixture surprisingly gave a selectivity that was not only lower than the weighted average "expected" value of 0.095%, it gave a selectivity to an undesired byproduct that was lower than was achievable using either catalyst alone. Further, Table A of Dr. Cheng's declaration (Example 8) shows that for a 2:1 ratio of MCM-22 to TEA-Mordenite, the n-propylbenzene selectivity was 0.075% as compared to an "expected" weighted average value of 0.098%. There would be no scientific reason for assuming that the benefit was limited to the range tested. Rather the two data points for the mixtures and the two data points for the individual catalysts define a curve which would indicate that all percentage combinations of the identified catalysts would be expected to yield some benefit.

Minimal experimentation would be required for one of ordinary skill in the art to choose molecular sieve catalyst mixtures from those disclosed by Applicants or the percentages to use in order to optimize with respect to a given by-product at the desired operating conditions.

Accordingly, it is respectfully urged that the Examiner withdraw this rejection in view of the claims as amended herein. Allowance of the present claims is therefore earnestly requested.

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CONCLUSION

In view of the foregoing comments, entry of this Amendment and allowance of this application is earnestly solicited. Should the Examiner have any further comments or questions, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,

Date

9/15/03
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Linda A. Kubena

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